

REMARKS**Amendments to the Claims:**

Claims 1-10 are pending. Claims 1-3, 7 and 8 have been amended to clarify the subject matter and to render the claims more clearly distinguishable over the cited references without adding new matter.

Rejections under 35 U.S.C. 112:

Claims 1, 2, 7 and 8 have been amended to overcome the rejection under 35 U.S.C. 112.

The claimed subject matter should now be clear in that the incident reference beam is formed by the incident reference beam providing means from the initial reference beam and the incident reference beam is smaller in size and is toward a given one of the incident locations on the lens. More importantly, as defined in claim 2, the incident reference beam providing means has an iris which transmits only a portion of the initial reference beam to form the incident reference beam from the initial reference beam. The fact that the beam providing means also parallel shifts the incident reference beam toward a given one of the incident locations on the lens and does not deflect it is significant to the present invention. The specification explains this starting on page 9. The iris 206 is part of the incident reference beam providing means for providing, i.e., forming, an incident reference beam of reduced size to improve the recording density of the holographic medium

230. As explained on pages 11-21, the incident location of the reference beam may be altered by changing the position, i.e., shifting the position of the iris. Fig. 5 is an example of this.

Accordingly, the rejection of the claims under 35 USC 112 alleging that the claims fail to comply with the enablement requirement is without basis and should be withdrawn.

Rejections under 35 U.S.C. 103(a):

The rejection of claims 1-2, 7-9 and previously added claims 10-11 under 35 U.S.C. 103(a) as being unpatentable over Goulianian et al (US 2005/0122549 A1) in view of Tanaka et al. (US 6,256,281) has been carefully considered but is most respectfully traversed. Claim 11 has been cancelled.

Applicant wishes to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143.

This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Further, MPEP § 2143.03 states that all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

This rejection is respectfully traversed on the grounds that a *prima facie* case of obviousness of the amended claims has not been established.

The present invention is related to a volume holographic digital data storage system capable of angular-multiplexing, which includes: a light generator 200 for generating a laser beam; a beam splitter 204 for separating the laser beam into a signal beam and a initial reference beam; a SLM 218 for modulating the signal beam into binary pixel data on a page-by-page basis based on data inputted from outside; a lens 216 for focusing an incident reference beam on a storage medium 230, the lens 216 having a plurality of incident locations for the incident reference beam; and an incident reference beam providing means for forming the

incident reference beam with the incident reference beam being of a size smaller than the size of the initial reference beam. The incident reference beam is formed by transmitting a portion of the initial reference beam through an iris of the incident reference beam providing means which also includes an actuator for moving the iris., i.e., parallel shifting the incident reference beam toward a given one of the incident locations on the lens 216. The incident reference beam is a plane wave and the neighboring incident locations on the lens 216 are spaced apart from each other by a certain degree for page separation.

The cited Goulianian et al. reference teaches methods and apparatuses for forming holograms of any object with the intent of preserving 3-D characteristics by optical techniques controlled by a computer according to three-dimensional data representing the objects in a computer database and recording their three-dimensional images. As shown in Figs. 7 and 8, a reference beam 74 becomes a spherical wave after passing through a focusing lens 85. However, the reference beam 74 thereafter becomes a plane wave 89 after passing through a collimating lens 88. Further, as described in the paragraph [0198], an ensemble of optical means is used for changing the reference beam in size and parallel shifting the reference beam 74 with respect to itself and with respect to an axis of the collimating lens 88 and for orienting the plane wave in an established direction to provide complete coverage of the reference beam 89 on a corresponding area 51 of recording medium 50. Namely, the plane wave 89 passed through the collimating lens 88 shifts with respect to the axis of collimating lens 88. Accordingly, an angle of

incidence of the reference beam 89 onto the recording medium 50 is maintained constant. (See, each incident angle of the reference beam 89 to the areas 51 and 58 of the recording medium 89 in Fig. 8.)

The present invention as set forth in amended claim 1 is completely different from the teaching of Goulianian. In the present invention as explained earlier, the incident reference beam providing means parallel-shifts the incident reference beam to thereby shift the incident reference beam toward one of the incident locations on the lens (for example, this can be realized by actuating the iris 206 on a plane). This is not a deflection of the incidence reference beam. Therefore, although the incident locations are difference each other, an angle between the optical axis of the lens 216 and the direction of the incident reference beam is constant and thus, the beams passed through the incident locations of the lens are directed with different refracted angles but to a same location on the storage medium. As a result, angular multiplex recording is achieved. In contrast, in Goulianian, a deflector 86 is used to change the incident location of the beam on the collimating lens 88. The deflector 86 operates as an oscillatable mirror driven by an actuator 87 in both directions at right angles to each other (see Figs. 7 and 8), and the angle between the axis of the collimating lens 88 and the direction of the beam varies on each of the incident locations. Therefore, after passing though the collimating lens 88, the beams are collimated and not directed to a same location on the storage medium. As a result, angular multiplex recording is not available nor is it suggested by Goulianian.

Further, it is widely known that the beam projected to the storage medium should be a spherical wave to be able to effectively realize angular multiplexing in the holographic apparatus. In the present invention, the lens 216 receives the incident beam (which is a plane wave) from the incident reference beam providing means. Since the lens 216 focuses the incident beam, the beam, after passing through the lens 216, becomes a spherical wave. In contrast, in Goulianian, the beam passed through the collimating lens 88 is a plane wave because the collimating lens 88 collimates the beam. Therefore, angular multiplexing cannot be effectively realized in Goulianian.

The optical system in Tanaka uses a plane wave to record various holograms. Moreover, Tanaka only discloses spatial multiplexing and does not suggest angular multiplexing and/or shift multiplexing of a spherical wave through a lens. Accordingly, applicant most respectfully submits that the teaching of Tanaka does not overcome the deficiencies of the primary reference Goulianian.

Regarding claim 2, the incident locations are changed by the iris actuated by the actuator. However, in Goulianian, the incident locations are changed by the deflector 86. The means 83 merely adjusts beams in size (see paragraph [0198],[0215]). Although Goulianian discloses "parallel-shifting" in paragraph [0198], using the deflector 86 and the collimating lens 88, no suggestion exists for parallel-shifting the reference beam by the means 83 (which allegedly corresponds to the iris 206 of the present invention). More specifically, the beam passed through the

collimating lens 88, not the beam incidenced into the collimating lens 88, is parallel-shifted (see Figs. 7 and 8). There is no disclosure of using the means 83 to parallel-shift the reference beam incidenced into the collimating lens. Therefore, Goulianian and Tanaka fail to disclose an iris actuated by an actuator to parallel shift a beam directed from the iris to the lens.

As a result, one of ordinary skill in the art at the time of the invention would not have been motivated to combine the teachings of Goulianian with Tanaka for angular multiplexing and shift multiplexing using a spherical wave as a reference beam. Accordingly, the applicant respectfully submits that the amended claims 1 and 2 are allowable over the cited references.

Claims 3-10 depend from claim 1 and or 2 and are therefore believed to be allowable for the same reasons indicated above.

CONCLUSION

Applicant believes that this is a full and complete response to the Office Action. For the reasons discussed above, applicant now respectfully submits that all of the pending claims are in complete condition for allowance. Accordingly, it is respectfully requested that the Examiner's rejections be withdrawn; and that claims 1-10 be allowed in their present form.

Should the Examiner believe that a personal discussion might be helpful in advancing this case to allowance, the Examiner is invited to telephone the undersigned.

Reconsideration and allowance of claims 1-10 is respectfully solicited.

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Respectfully submitted
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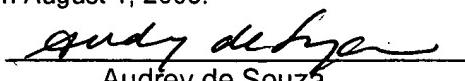
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CERTIFICATE OF MAILING

I hereby certify that this *Amendment* is being deposited with the United States Postal Service via First Class Mail addressed to Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on August 1, 2006.


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